WHAT IS CLAIMED IS:

1. An optical waveguide device comprising an optical waveguide layer and a light-receiving element, the optical waveguide layer being provided with a first light direction-altering means which alters the direction of a light propagated in the optical waveguide layer and directs the light to the light-receiving element, the light-receiving element being provided with a plurality of light-receiving portions, each of the light-receiving portions being capable of receiving signals independently.

2. The optical waveguide device according to Claim 1, wherein the optical waveguide layer is further provided with a light-emitting element, and a second light direction-altering means for receiving light emitted from the light-emitting element at an angle to an in-plane direction of the optical waveguide layer, wherein the second light direction-altering means and the light-emitting element are in such a relative position that light emitted from the light-emitting element is directed into the optical waveguide layer.

3. The optical waveguide device according to Claim 1 or 2, wherein the light-receiving element comprises a plurality of light-receiving portions

arranged in a circular form, and the first light direction-altering means allows the light-receiving element to receive the light propagated from all directions in the optical waveguide layer, and the light-receiving element discriminates the transmitting source of the received light based on a light intensity distribution that varies depending on the position of the transmitting source of light.

4. The optical waveguide device according to Claim 3, wherein the first light direction-altering means is in a form of a hemispheric or conic structure embedded in the optical waveguide layer.

5. The optical waveguide device according to Claim 1 or 2, wherein the light-receiving element includes at least a plurality of light-receiving portions that are linearly arranged, and the first light direction-altering means allows the light-receiving element to receive light propagated from a predetermined region in the optical waveguide layer, and the light-receiving element discriminates the transmitting source of the received light based on a light intensity distribution that varies depending on the position of the transmitting source of light.

6. The optical waveguide device according to

Claim 5, wherein the first light direction-altering means is in a form of a half cylindrical or triangular structure laid sideways and embedded in the optical waveguide layer.

7. The optical waveguide device according to Claim 3 or 4, wherein the device is configured to propagate incident light from the light-emitting element in every direction in the optical waveguide layer, and to detect the optical signal discriminating the position of the light-emitting element by using the light-receiving element, so as to simultaneously receive optical signals from a plurality of light-emitting elements in the same optical waveguide layer with one single light-receiving element.

8. The optical waveguide device according to Claim 3 or 4, wherein the device is configured to propagate incident light from the light-emitting element at a specific emission angle in the optical waveguide layer, and to detect the optical signal by the light-receiving element discriminating the position of the light-emitting element so as to simultaneously receive optical signals from a plurality of light-emitting elements in the same optical waveguide layer with one single light-

receiving element.

9. The optical waveguide device according to Claim 5 or 6, wherein the device is configured to propagate incident light from the light-emitting elements as parallel beams in a specific direction in the optical waveguide layer, and to detect the optical signals by the light-receiving element discriminating the positions of the light-emitting elements so as to simultaneously receive optical signals from a plurality of light-emitting elements in the same optical waveguide layer with one single light-receiving element.

10. An optical waveguide device comprising a waveguide layer, a plurality of light-emitting elements, a plurality of light direction-altering means for the light-emitting means, a plurality of light-receiving elements and a plurality of light direction-altering means for the light-receiving elements, wherein a light direction altering means propagates light in a light propagation mode according to any one of Claims 7 to 9 and a light-receiving element receives light in a mode according any one of claims 7 to 9 to simultaneously exchange a plurality of optical signals in the same optical waveguide layer.

11. The optical waveguide device according to any one of Claims 1 to 10, wherein an electric wiring is provided on the surface of the optical waveguide layer to drive the optical element.

12. The optical waveguide device according to any one of Claims 1 to 11, wherein the device further comprises a relay means that receives propagated light, performs optical/electric (OE) conversion, performs electric/optical (EO) conversion to reproduce optical signals, and causes the light to propagate in the optical waveguide layer in a predetermined mode of propagation.

13. A layered substrate comprising an electric circuit board and an optical waveguide device according to any one of Claims 1 to 12 provided thereon with electric connections to operate an electronic equipment where interconnection of all or a part of the signals from the electric circuit is carried out by exchange of optical signals through the optical waveguide device.

14. The layered substrate according to Claim 13, wherein the optical waveguide device is embedded within an electric circuit multilayer substrate.

15. The layered substrate according to Claim 13 or 14, wherein the optical waveguide device is multilayered and connected to an electric circuit board and an electronic chip.

16. An electronic equipment having an optical wiring using a layered substrate according to any one of Claims 13 to 15 and multi-bit wirings between a plurality of electronic chips for system operation.